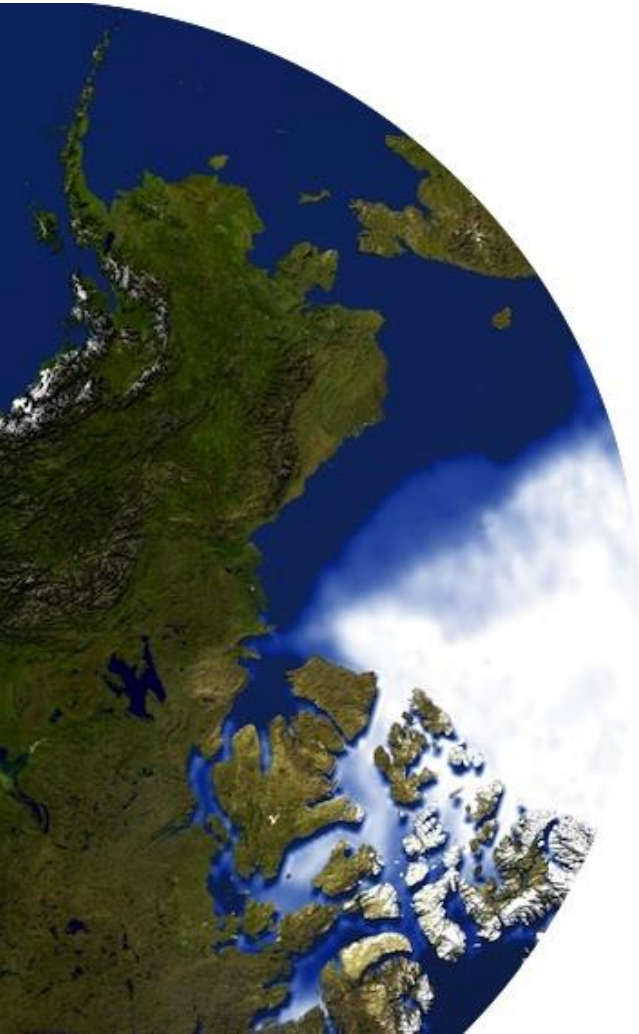
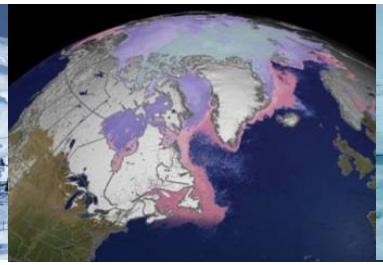
The Global Cryosphere Watch



Jeff Key

NOAA/NESDIS, Madison, Wisconsin USA

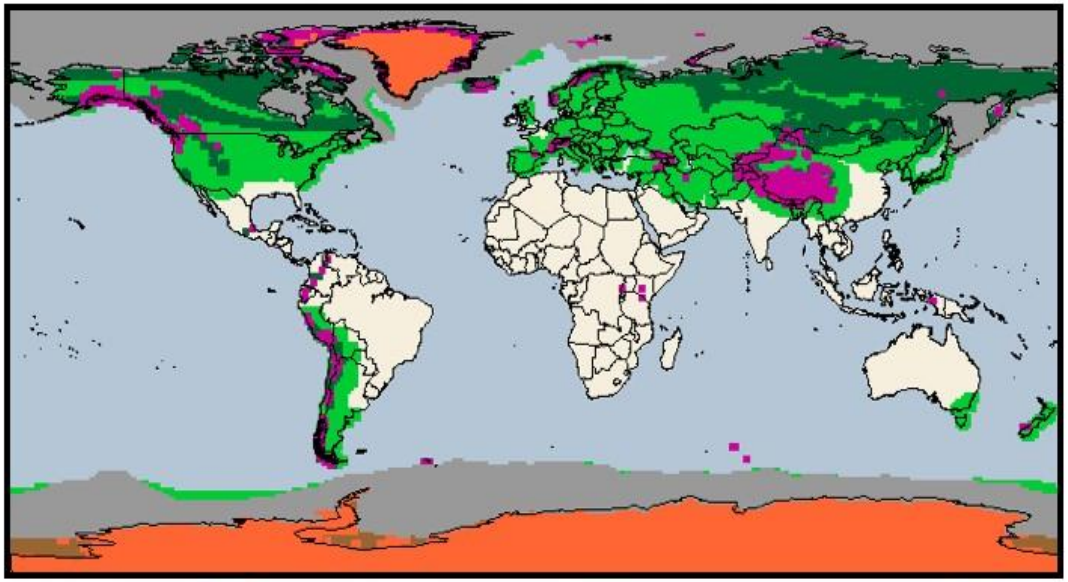



GCW Global Cryosphere Watch

South America GCW Meeting, Santiago, 27-29 October 2014

WMO

Global Cryosphere by Type



Glacier

Ice Sheets

Ice Shelves

Sea Ice

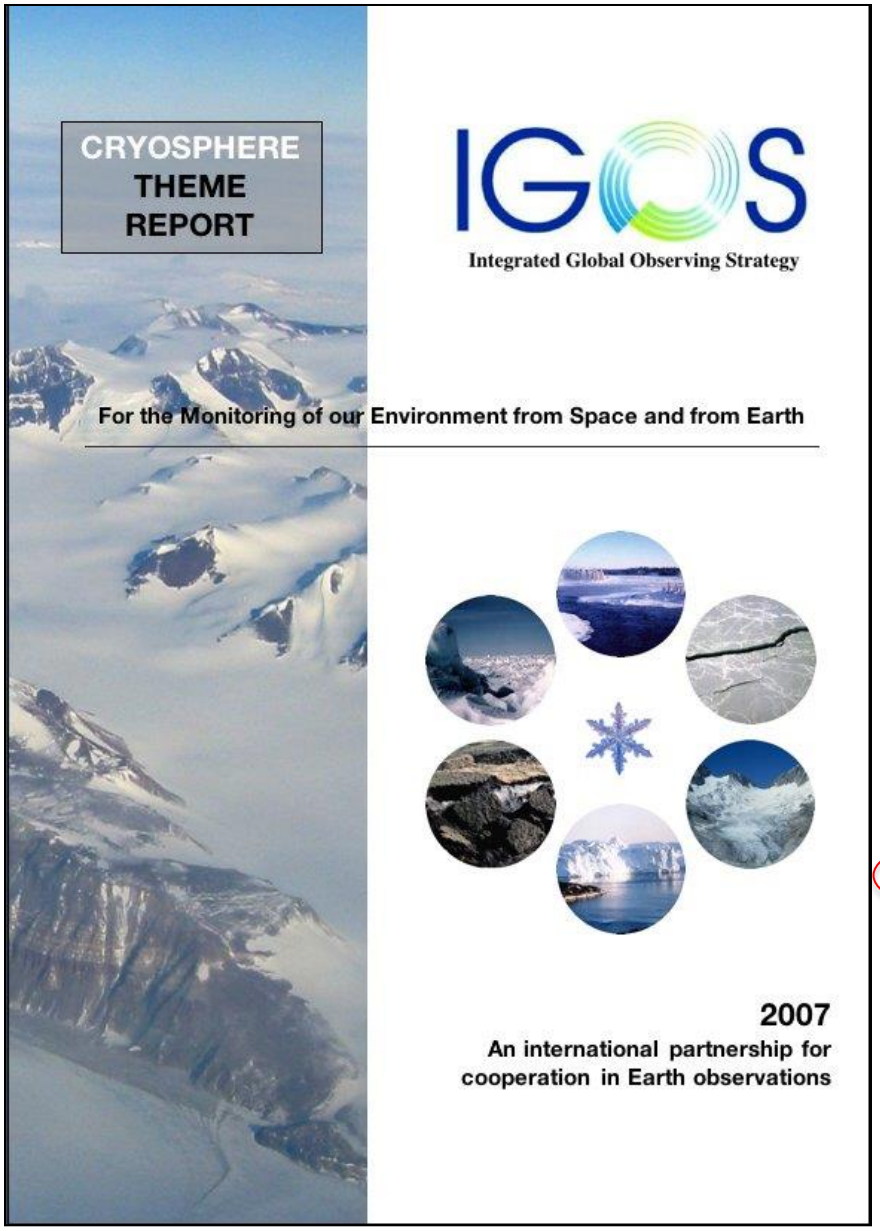
Permafrost

Snow Cover

Assessment with the goal of integration:

Integrated Global Observing Strategy Partnership

The IGOS themes were developed primarily to assess current observing systems, including capabilities and requirements.

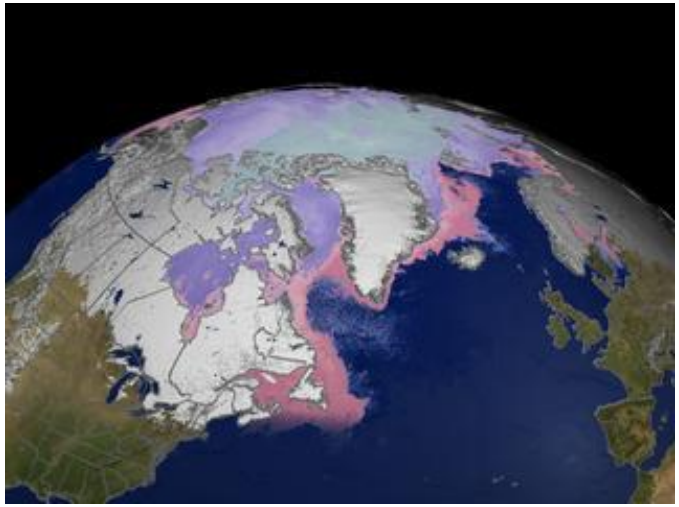


The IGOS Cryosphere Theme (2007)

Global Cryosphere Watch

The Global Cryosphere Watch (GCW)

The 16th WMO Congress (2011) agreed that *"WMO needs to have a focus on global cryosphere issues to be able to provide authoritative information to meet Members' responsibilities on regional and global weather, climate, water and related environmental matters"* and decided to embark on the development of the Global Cryosphere Watch (GCW), **as an IPY Legacy**, with a view of an operational GCW.



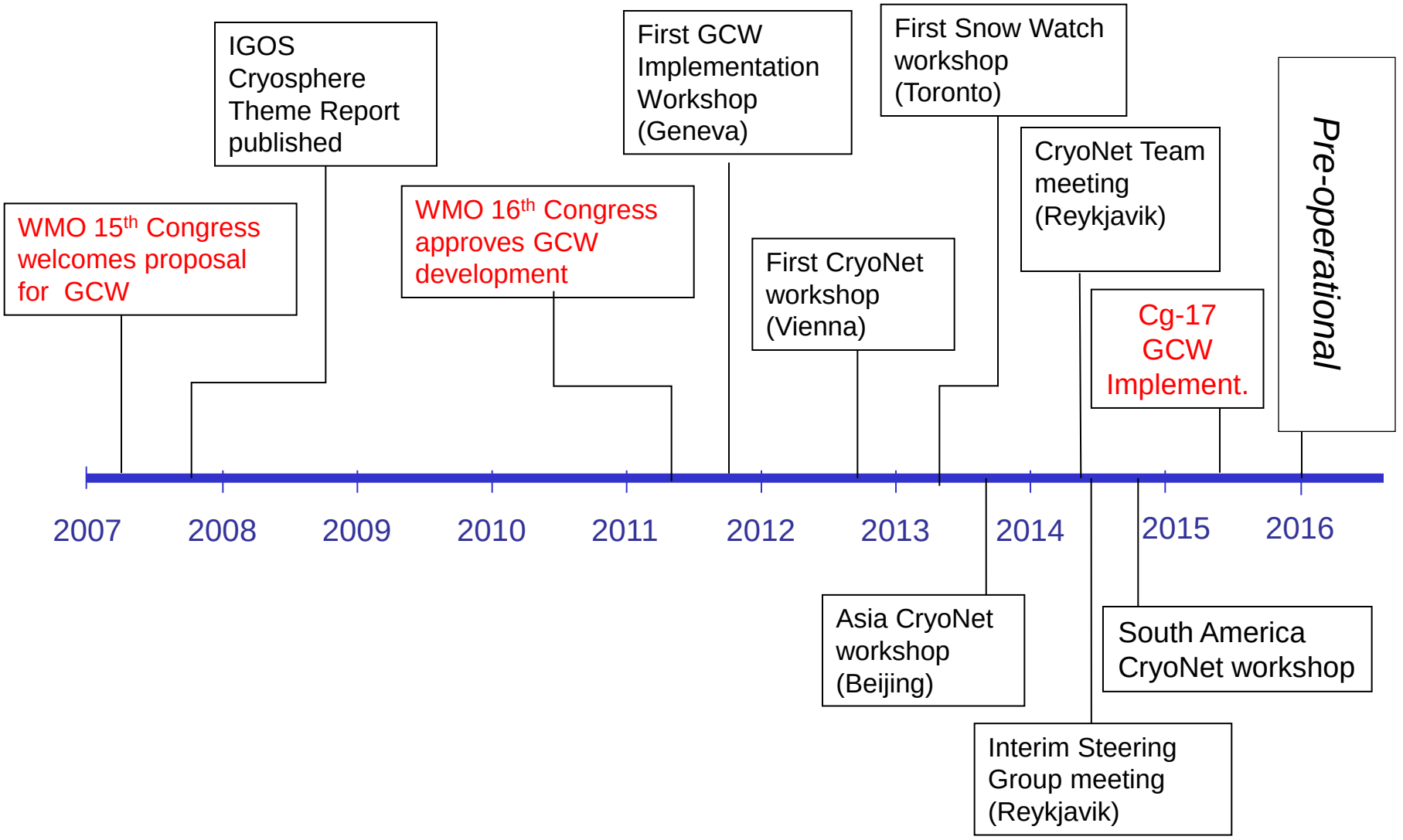
Global Cryosphere Watch – Mission & Objectives

Mission: *GCW will provide authoritative, understandable, and useable data, information, and analyses on the past, current and future state of the cryosphere to meet the needs of WMO Members and partners in delivering services to users, the media, public, decision and policy makers.*

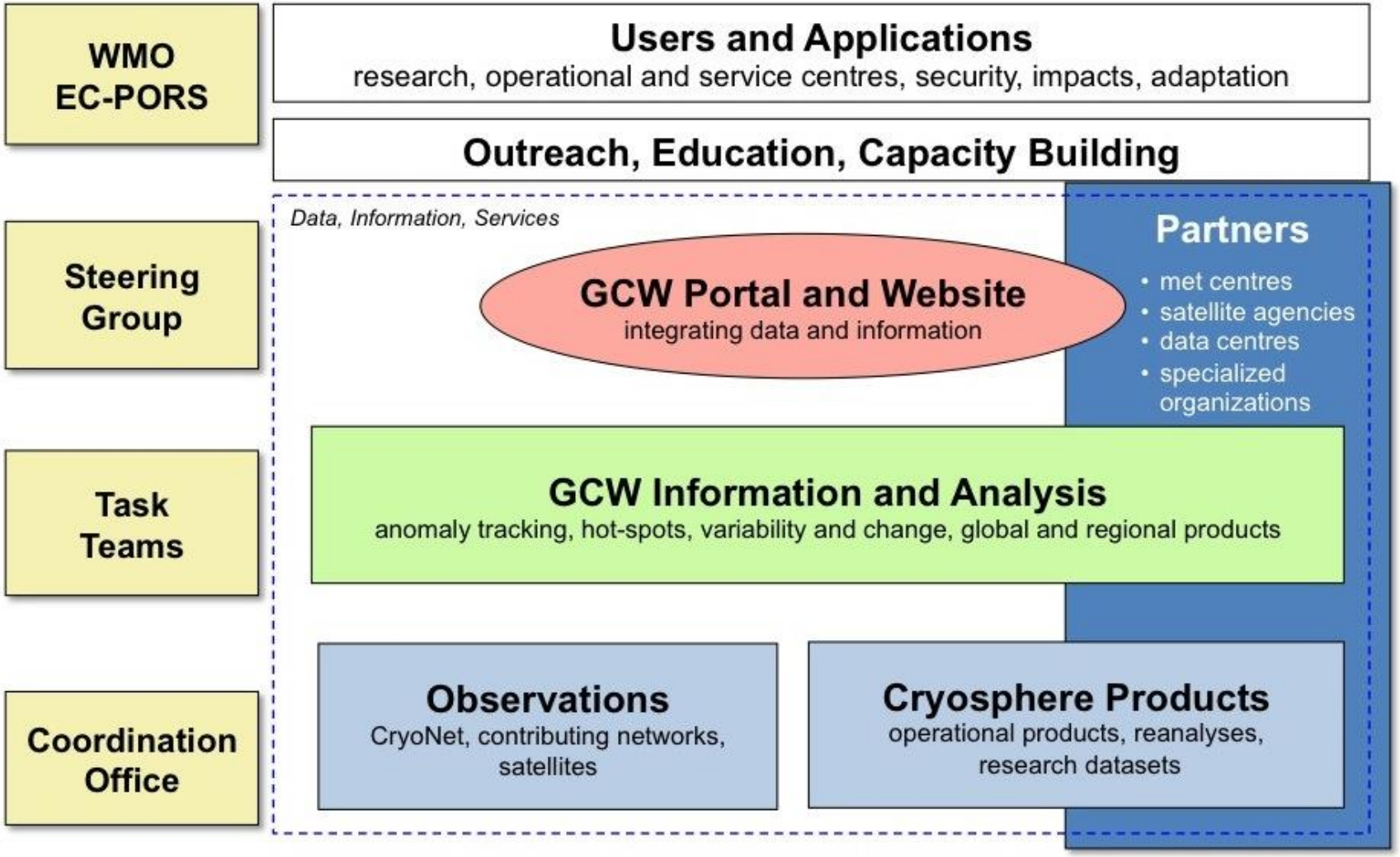
GCW will:

- Implement the IGOS (Integrated Global Observing Strategy) Cryosphere Theme (CryOS);
- **Facilitate reliable, comprehensive observations through an integrated observing approach in collaboration with relevant national and international programmes and agencies**;
- Provide the scientific community with the means to predict the future state of the cryosphere;
- Facilitate the assessment of changes in the cryosphere and their impact; support decision making and environmental policy development;
- Provide authoritative information on the current state and projected fate of the cryosphere for use by the scientific community, media, public, decision and policy makers – meet user needs.

GCW Development History



Organization: GCW Conceptual Framework



*The WMO Executive Council expert panel on Polar Observations, Research, and Services (**EC-PORS**) oversees GCW.*

What is GCW doing?

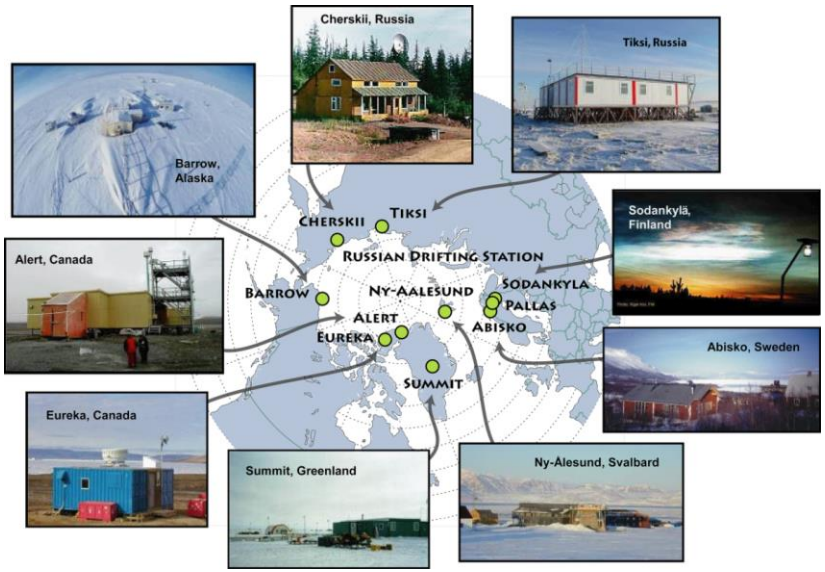
- developing a **network of surface observations** called "CryoNet", which builds on existing networks;
- developing **measurement guidelines** and best practices;
- refining **observational requirements** for the WMO Rolling Review of Requirements;
- engaging in and supporting, **intercomparisons of products**, e.g., the **GCW Snow Watch** project;
- contributing to WMO's space-based capabilities database (with PSTG);
- creating **unique products**, e.g., the SWE Tracker, in collaboration with partners;
- engaging in **historical data rescue** (e.g., snow depth);
- building a **snow and ice glossary**;
- developing international training and outreach materials;
- providing **up-to-date information on the state of the cryosphere**;
- providing **access to data** through a portal;
- co-sponsoring workshops.

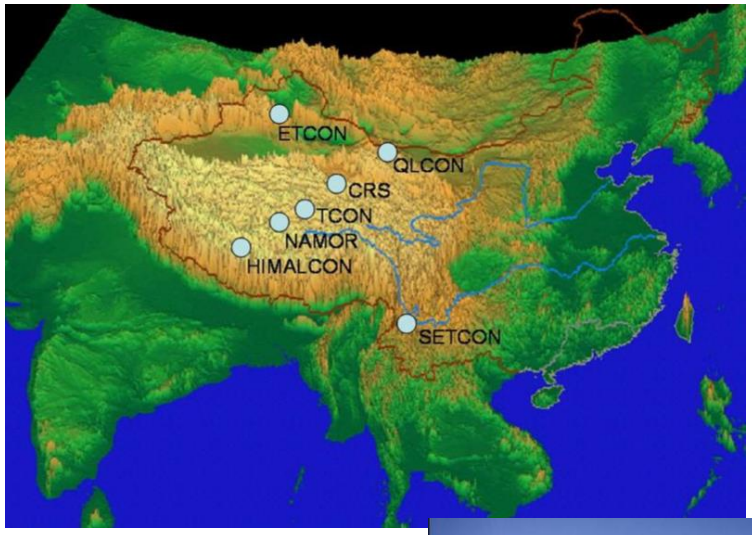
CryoNet – the core GCW Network

…an immediate priority in GCW development.

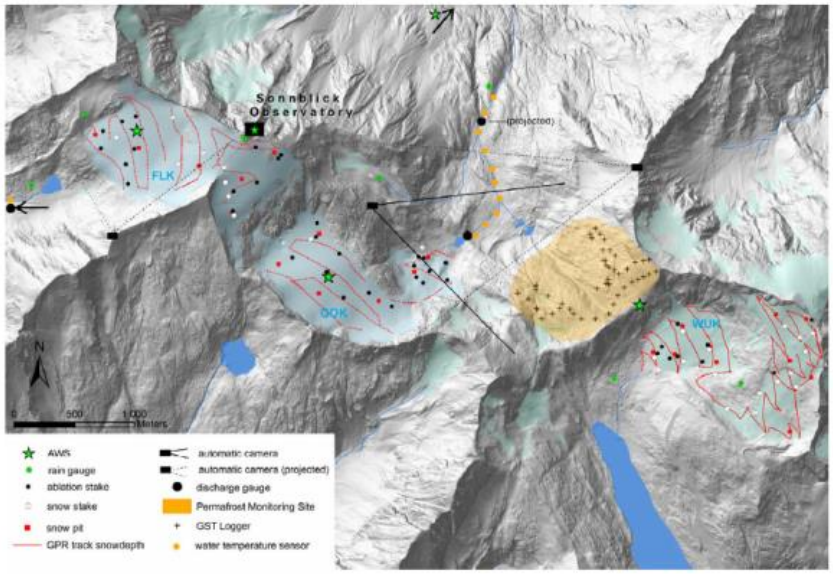
- Establish the core network of GCW surface measurement sites – CryoNet.
- CryoNet is one part of the whole GCW observing system, which is a component observing system of the WMO Integrated Global Observing System (WIGOS).
- CryoNet covers all components of the cryosphere (glaciers, ice shelves, ice sheets, snow, permafrost, sea ice, river/lake ice) through an extensive approach of in-situ observations.
- CryoNet is initially comprised of existing stations/sites, rather than creating new sites.

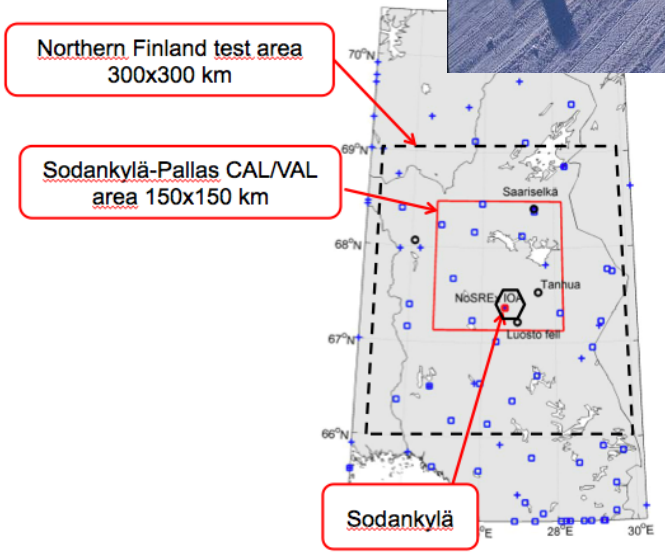
GCW CryoNet



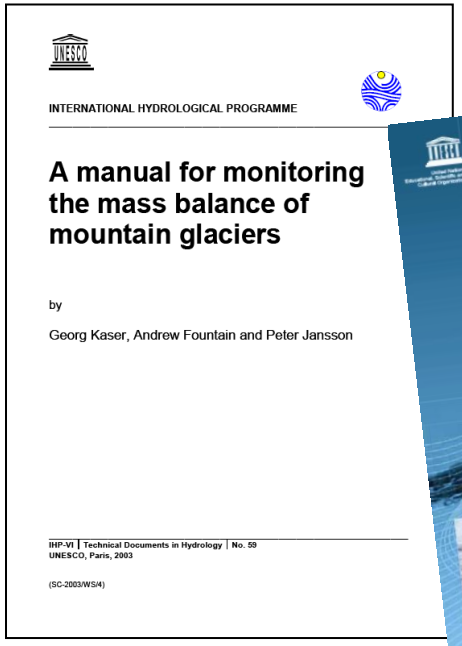


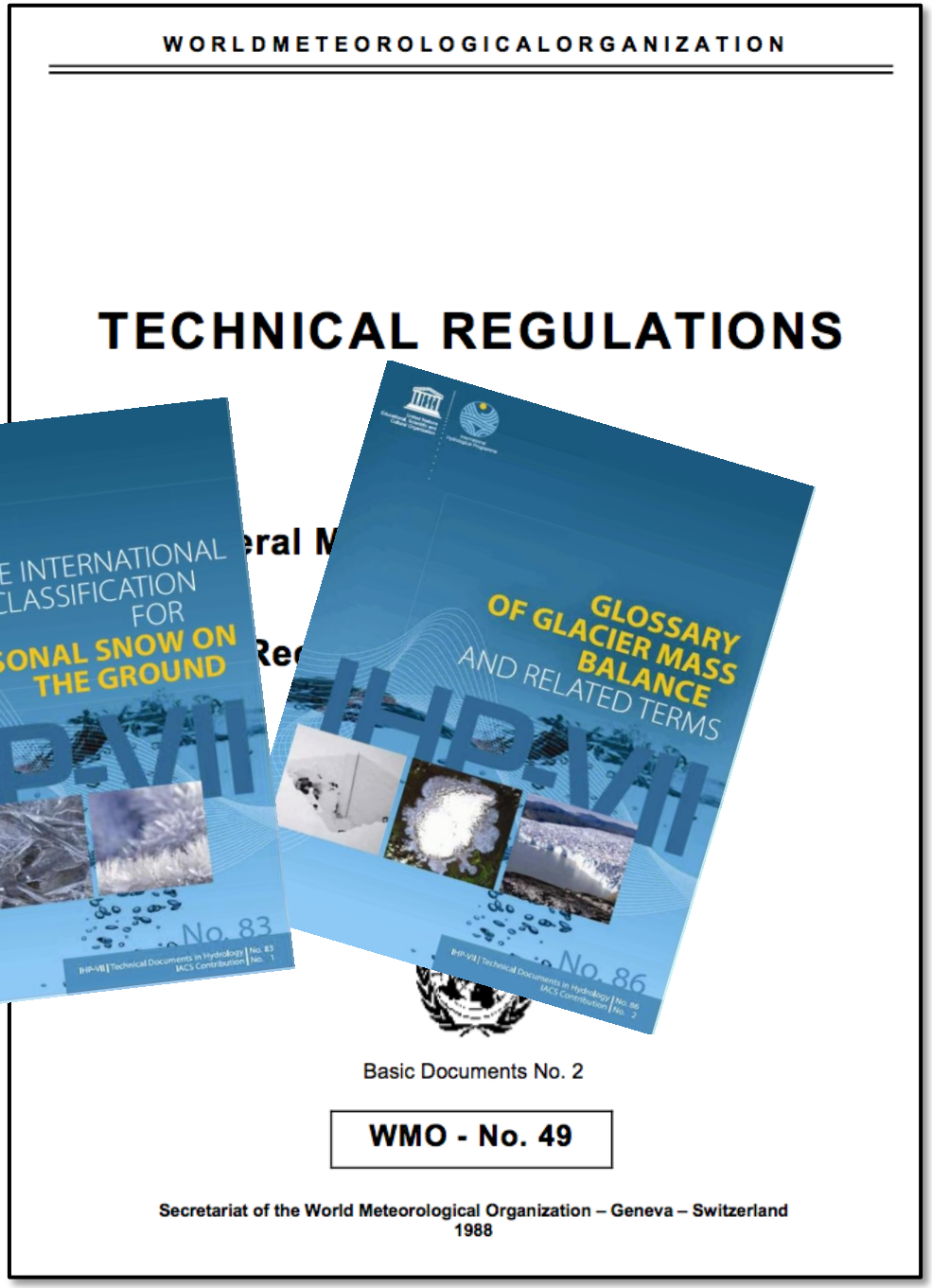
SONNBLICK network:





Measurement standards and practices





"IUGG urges snow and ice scientists, practitioners, and scientists from related disciplines to adopt these new schemes as standards."

Requirements and Capability for observations

- GCW Requirements are being formulated and documented on the GCW website;
- They will draw from various sets of existing user requirements and will be vetted by the scientific community;
- Those requirements will become part of the WMO Rolling Review of Requirements (RRR);
- Will be accessible through the Observing Systems Capability Analysis and Review Tool (OSCAR), the official source for WMO requirements, which has a cryosphere theme;
- **Need for a new application area "GCW".**

t page | World Meteorolo... | Google Translate | WIGOS | TT-WRM | Mindfulness Bell

World Meteorological Organization

Global Cryosphere Watch

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Observational Requirements

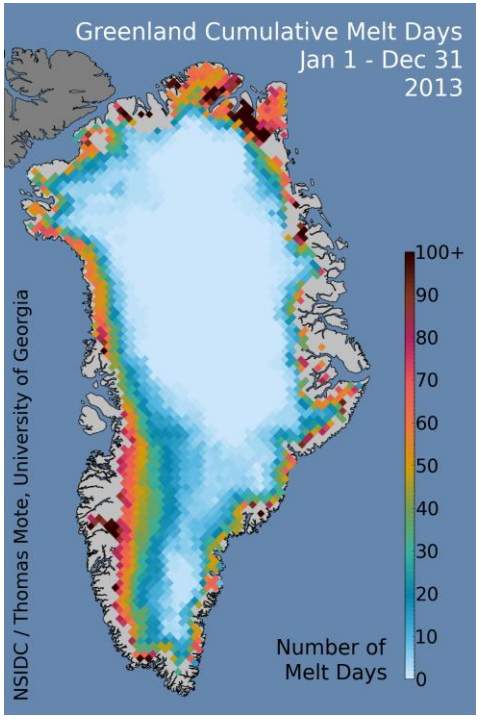
GCW observational requirements are being formulated. They will draw from various sets of existing user requirements and will be vetted by the scientific community. They will become part of the WMO Rolling Review of Requirements (RRR) and will be accessible through the Observing Systems Capability Analysis and Review Tool (OSCAR), which has a cryosphere theme. **OSCAR is the official source for WMO requirements.** The *IGOS Cryosphere Theme Report* (see Documents) contains the most comprehensive set of observational capabilities and requirements for the cryosphere. It is the starting point for GCW. The IGOS and OSCAR cryosphere requirements are given below. *Click the **Filter Options** button to filter the results.* Each entry in the table gives the current measurement capability in green, the threshold requirement (minimum necessary) in blue, and the objective requirement (target) in orange, if available.

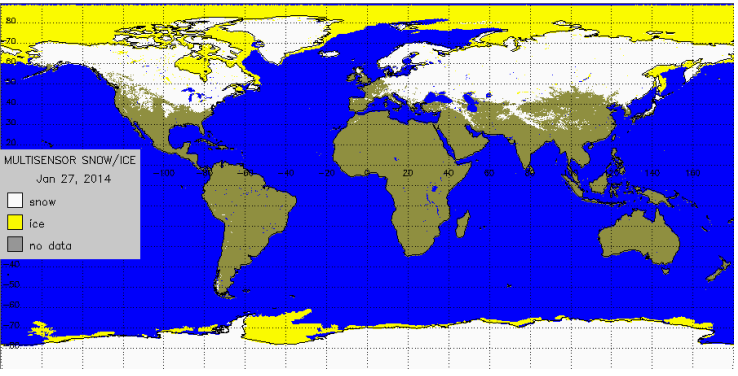
Filter Options

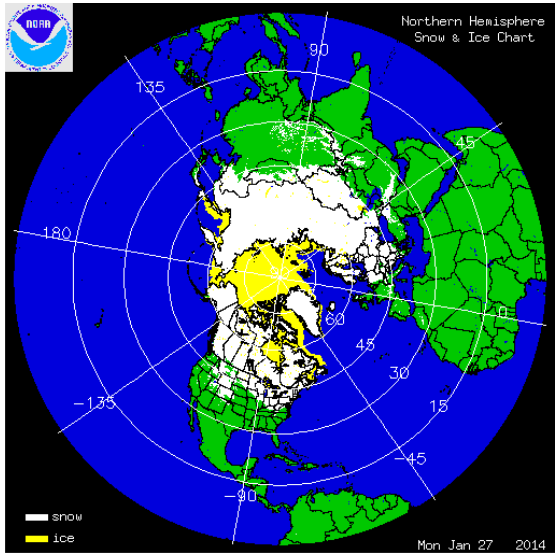
Variable	Element	Application Area	Special Conditions	Measurement Range, Low	Measurement Range, High	Uncertainty	Spatial Res	Temporal Res	Timeliness	Source
Ice thickness	Sea ice	CLIC		- - -	- - -	- 200 cm 100 cm	- 500 km 200 km	- 30 day 7 day	- 90 day 30 day	WCRP (OSCAR)
Ice thickness	Sea ice	IGOS	Climate	0 m 0 m 0 m	10 m 10 m 10 m	0.5 m - 0.1 m	0.5 km - 25 km	0.5 year - 1 month	- - -	IGOS 200
Ice thickness	Sea ice	IGOS	Operational	0 m 0 m 0 m	10 m 10 m 10 m	10% - 10%	0.5 km - 0.5 km	1 week - 1 day	- - -	IGOS 200
Ice thickness	Sea ice	Global NWP		- - -	- - -	- 100 cm 20 cm	- 250 km 15 km	- 30 day 1 day	- 30 day 24 hour	John Eyr (OSCAR)
Ice thickness	Sea ice	High Res NWP		- - -	- - -	- 100 cm 20 cm	- 40 km 2 km	- 2 day 12 hour	- 3 day 12 hour	T Montmerl (OSCAR)
Ice thickness	Sea ice	Climate-OOPC		- - -	- - -	- 1 cm 0.1 cm	- 500 km 100 km	- 7 day 1 day	- 24 day 24 hour	OOPC (OSCAR)
Ice motion	Sea ice	IGOS	Climate	0 km day^{-1} 0 km day^{-1} 0 km day^{-1}	100 km day^{-1} 100 km day^{-1} 100 km day^{-1}	5 km day1 3 km day^{-1} 1 km day^{-1}	25 km 25 km 1 km	1 day 1 day 1 day	- - -	IGOS 200
Ice motion	Sea ice	IGOS	Operational	0 km day^{-1} 0 km day^{-1} 0 km day^{-1}	100 km day^{-1} 100 km day^{-1} 100 km day^{-1}	0.5 km day^{-1} 3 km day^{-1} 0.5 km day^{-1}	1 km 25 km 0.1 km	3 day 1 day 1 day	- - -	IGOS 200

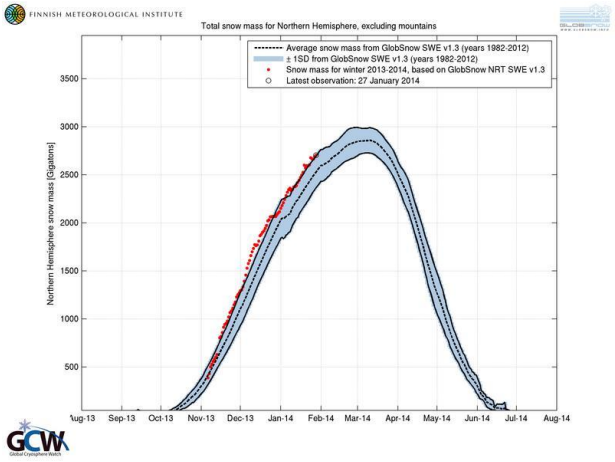
Other Products and Services

- Identification and development of initial products
- Development of hemispheric snow ”anomaly” trackers for snow cover & SWE
- An inventory of snow datasets
- Product intercomparison:
  - Snow intercomparison project ESA SnowPEX
- Glossary

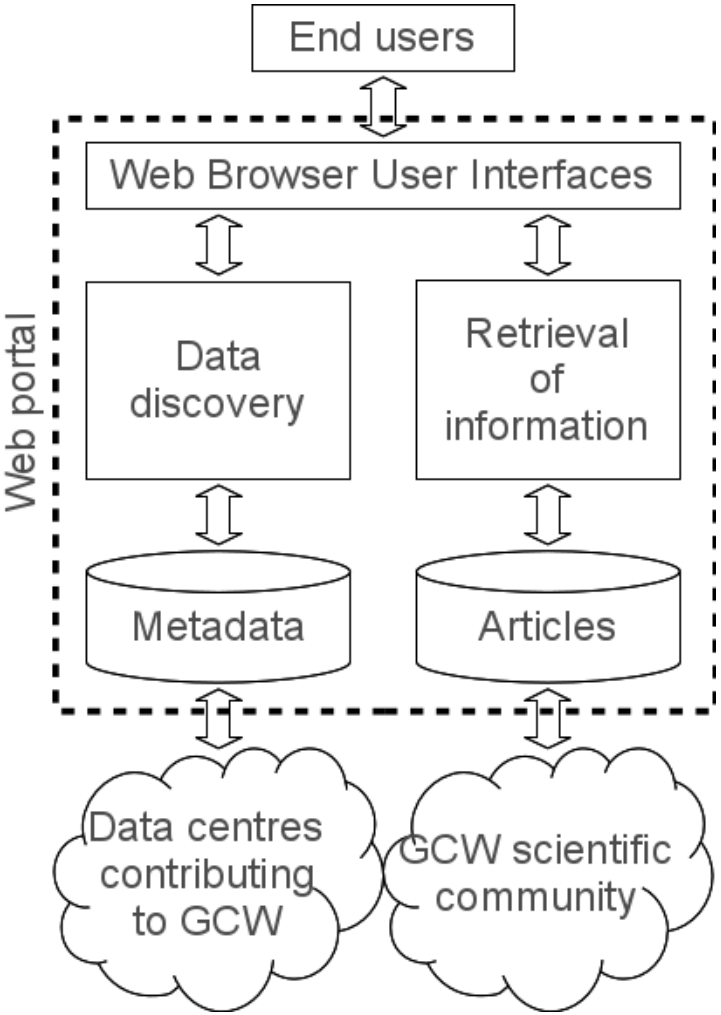


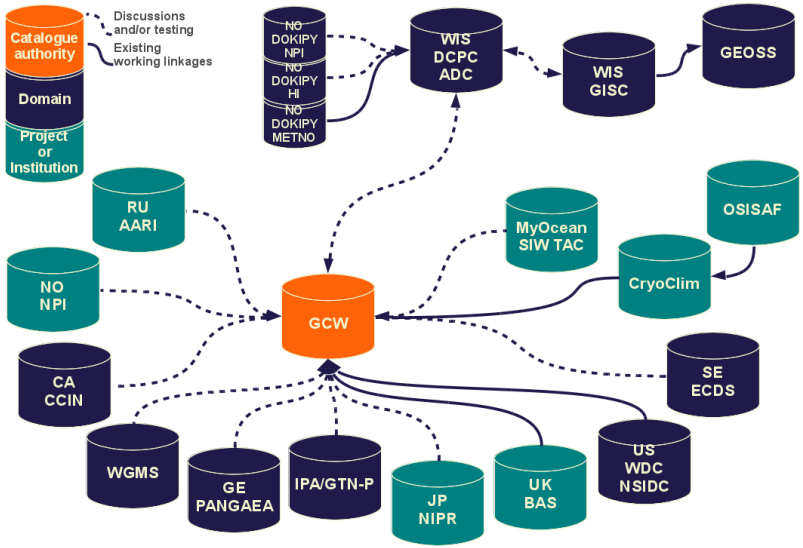


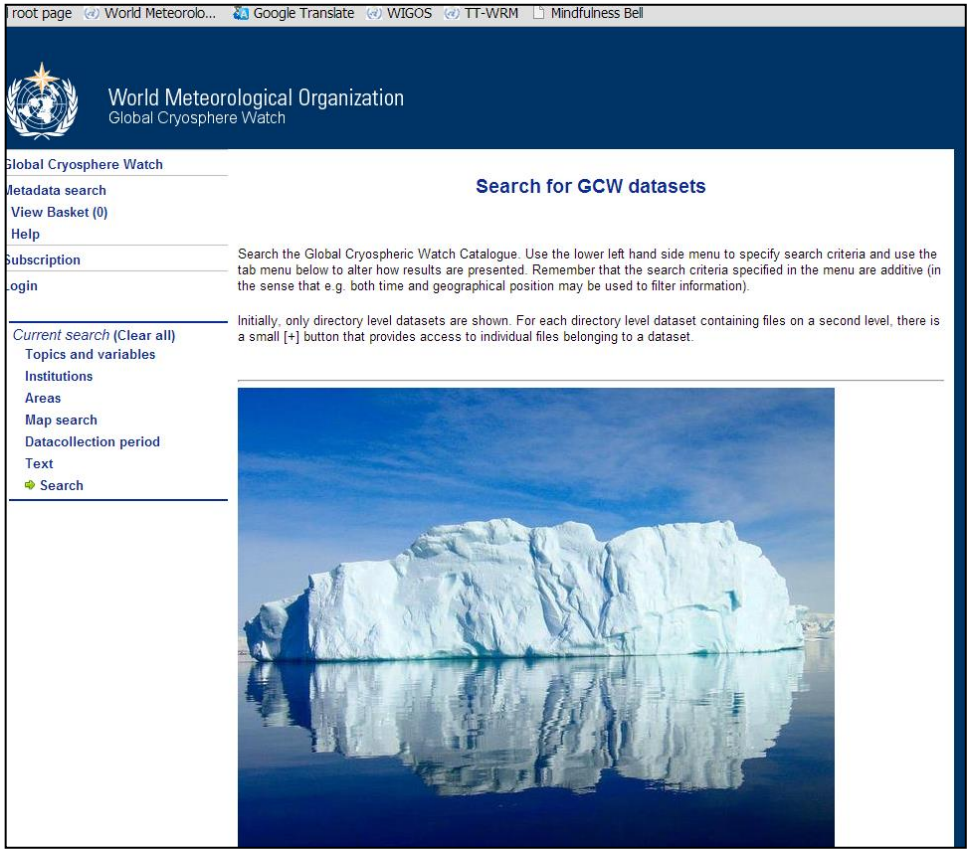




Portal and Website







http://gcw.met.no

Portal and Website

- About GCW – impact, framework
- GCW News
- Cryosphere now - products
- CryoNet – site requirements, practices
- Activities – mtgs, projects
- Outreach – forum, video
- References – Glossary, acronyms, GCW documents

http://globalcryospherewatch.org

Why be a part of CryoNet and GCW?

- Being a CryoNet site means being part of an international, operational, global observing system providing observations of known quality for research and knowledge beyond a site's local region.
- Being part of a global network not only brings better visibility, but also a recognition of the importance of the observations made at your site.
- This in turn can bring better support, either funding or logistical support.
- GCW promotes the exchange of knowledge and data, so CryoNet sites may see broader use of their data and products.